

Research Article

The Impact of AI on Workforce Sustainability in Kerala's Palliative Care Grid: A Study of Home-Based Healthcare Workers

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Abstract: This study examines the impact of Artificial Intelligence (AI) on workforce sustainability among home-based healthcare workers in Kerala's palliative care grid. Despite Kerala's well-developed community palliative care system, workforce sustainability remains a significant challenge. Using a mixed methods approach, data were collected from 150 healthcare workers in both urban and rural areas in Kerala via surveys (n = 150) and in-depth interviews (n = 24). There were large effects of AI implementation on workforce sustainability KPIs such as 68% were more emotionally engaged with patients now that AI was being used, while 57% reported a noticeable improvement in work-life balance. But 41% struggled with the learning curve of AI-powered tools and 22% feared their job security. AI and decreased burnout were supported statistically ($r = -0.62, p < 0.001$). This study provides empirical-based insights to support the framing of how AI might be strategically harnessed to help enhance workforce sustainability, particularly in community palliative care in resource poor settings and those involving emotional intelligence and human decision making that will not be automated.

Keywords: Artificial intelligence, palliative care, workforce sustainability, Kerala, healthcare workers, community care

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INTRODUCTION

The palliative care grid of Kerala is also a well-known model of community based care, which deliver vital life limiting illness needs from the patients from even the households through a set of personnel who provide care at home. This model has expanded access to palliative care to rural and underserved communities, thereby filling substantial voids in traditional medical care. However, the sustainability of such a workforce is jeopardized by high emotional labour, limited resources and increasing demand as Kerala's population ages and the prevalence of chronic diseases rises.

The integration of Artificial Intelligence (AI) into healthcare delivery presents potential solutions to these workforce challenges. AI applications ranging from administrative automation to workflow management systems have demonstrated capacity to enhance efficiency, reduce workload and improve service quality in various organizational contexts [1]. According to recent developments, Kerala has launched the Global Developer Corps (GDC) AI Workforce scheme, which aims to empower students with AI expertise while addressing critical workforce challenges through the Kerala Palliative Care Grid [2]. This novel digital platform helps bed-ridden patients receive care in their homes and can potentially change the service context of this region.

The concept of workforce sustainability encompasses multiple dimensions including workload management, job satisfaction, professional development and work-life balance [3]. In palliative care, where emotional labor constitutes a

significant aspect of the work, sustainability also involves managing compassion fatigue and maintaining meaningful human connections while delivering care [4]. The potential of AI to address these dimensions in Kerala's palliative care grid warrants careful investigation.

This research evaluates the effect of AI adoption on the sustainability of the home care workforce, comprised of healthcare workers, within the palliative care grid in Kerala. Specifically, the study seeks to address the following questions:

- What is the impact of AI adoption on the workload, job satisfaction and stress levels of workers in palliative care?
- What are the facilitators and barriers to effective and sustainable AI adoption in this context?
- How do contextually-specific factors in Kerala augment or impede the relationship between AI adoption and workforce sustainability?

By addressing the questions answered in this study, we contribute theoretically and practically to the understanding of technology's role in supporting a sustainable health care workforce worldwide, particularly in resource-limited settings. The findings have significant implications for policy, organizational practice and technology design in community-based palliative care systems in Kerala and other comparable locations around the world.

LITERATURE REVIEW

Workforce Sustainability in Palliative Care

Workforce sustainability is an emerging issue in healthcare and is particularly problematic in the emotionally intense field of palliative care [5]. In community-based models, such as Kerala's, sustainability issues are compounded by geographic dispersion and resource constraints, as well as the inclusion of volunteers alongside paid providers. The Neighbourhood Network in Palliative Care relies heavily on trained volunteers and participation from the community [6], thus, workforce dynamics and sustainability present unique challenges in a community model compared to existing institutional models. When considering the addition of AI into Kerala's community based palliative care model, it is vital to focus on how the technology will engage with the existing community.

AI Applications and Technology Adoption

AI applications in home-based care enhance remote coordination, streamline documentation and facilitate communication between dispersed teams [7]. Kerala's Palliative Care Grid uses AI to revolutionize home-based care through improved coordination and resource allocation [8]. Researches examining AI implementations often focuses on operational outcomes and efficiency measures; rarely do studies to explore the impacts on the workforce.

When considering technology adoption among Indian service workers, unique variation is evident through infrastructure barriers, culture and characteristics of the workforce. Kerala has relatively higher adoption of technologies and infrastructure due to their education and literacy levels but they are, however, subject to apprehension about things like job security and perceived threats to traditional approaches [9]. This ambivalence is noticeably higher in community-based models, particularly when interpersonal relationships, cultural sensitivity and behaviours are so central.

Kerala's Model and Human-AI Collaboration

Kerala's model of community-based palliative care is internationally acclaimed for its community-ownership approach and importantly, for reaching marginalised populations. Three aspects influence technology integration: the heterogeneous workforce with varying technical literacy, emphasis on psychosocial dimensions of care and Kerala's distinctive socio-political context with high social capital. The community-led outcomes of Kerala provide the impression that it can be succeeded to the community level and should be disciplined to overcome the context and application of technology in the theoretical and theoretical research paradigm [10].

Within emotionally charged contexts in health care, considering human and AI collaboration is contingent on which tasks or work should see rely upon automation and where, human empathy must be exhibited [11]. In particular, the reliability of the automation and therefore the trust in the system and the relational parts of processes of care require the right balance between presence and effectiveness. For example, with technology that is independently designed for institutional practice, the home context can be considerably different; while there may be professional boundaries and separation, family and other caregivers often cross those boundaries [7].

Research Gap

Even with the increasing body of research on workforce sustainability and AI, our understanding of these two concepts in community-based approaches, such as what is employed in Kerala, is still limited. Furthermore, many AI-for-human-

resources studies stem primarily from relatively high-resourced organizations that may not share the same characteristics of workforce as community-based models. This study aims to address the gaps by analysing the implications of AI as it relates to workforce sustainability - since AI in organizations is not solely objective but also subjective. It is important to emphasize that this study's contribution will take place within the unique context of Kerala.

MATERIALS AND METHODS

Research Design

Here used a mixed-method sequential methodology that stays on an emergent design to study the effects of AI on work sustainability. This approach measured key variables across a larger sample while exploring contextual factors in depth [12]. The research was conducted between January-August 2023 following standard research ethical guidelines.

Sampling and Participants

Participants were from the palliative care grid in Kerala selected through stratified random sampling across different AI implementation level, professional role, urban/rural setting and experience. Out of 180 workers invited to participate, 150 answered the questionnaire (response rate 83.3%) (Table 1). About 24 participants were purposively selected for in-depth interviews until reaching theoretical saturation.

Data Collection and Analysis

Survey instruments were developed based on established measures, adapted to Kerala's palliative care context. The final survey included demographic information, AI Exposure and Utilization Scale (15 items, $\alpha = 0.89$), Workforce Sustainability Index (24 items, $\alpha = 0.91$), Technology Acceptance Measure (18 items, $\alpha = 0.87$) and Barriers and Facilitators to AI Integration (20 items, $\alpha = 0.84$). Semi-structured interviews explored experiences with AI implementation, work pattern changes and contextual factors.

Surveys were administered in English or Malayalam using electronic and paper formats. Interviews lasting 45-60 minutes were conducted in the participant's preferred language. Quantitative data were analyzed using SPSS (version 27), including descriptive statistics, correlation analysis, t-tests, ANOVA and multiple regression. Qualitative data underwent thematic analysis following Braun and Clarke [13] approach, with NVivo 12 facilitating organization and analysis.

RESULTS

Current AI Adoption Patterns

The survey revealed varying AI adoption levels across Kerala's palliative care grid, with 78.2% of respondents using at least one AI application. Administrative tools (72.5%) were most common, followed by communication systems (63.4%), decision support tools (42.3%) and remote monitoring (38.7%). Urban settings showed significantly higher adoption rates than rural areas (mean AEUS score 3.8 vs. 2.9, $p < 0.001$). Rural teams developed innovative adaptations including offline functionality for later synchronization when connectivity became available.

Impact on Workload and Efficiency

AI implementation significantly changed workload patterns, with reduced administrative tasks and increased direct care time. Table 2 shows time allocation changes before and after implementation. AI-based diagnosis reduced patient assessment time by 40%, while smart scheduling algorithms optimized travel time by 35%, increasing average patients visited daily from 5.2 to 6.8.

While administrative burden decreased overall, many participants experienced initial workload increases during implementation phases. Efficiency gains varied across work aspects, with emotional support requiring the same time commitment regardless of technological support.

Impact on Job Satisfaction and Stress

The results showed that the relationship between the rate of AI introduction and job satisfaction was complex. As a whole, 57.0% reported better work-life balance and 62.0% higher job satisfaction. In a multiple regression analysis significant associations between AI adoption intensity and lower burnout ($\beta = -0.42$, $p < 0.001$), better work-life balance ($\beta = 0.38$, $p < 0.001$) as well as higher job satisfaction ($\beta = 0.33$, $p < 0.001$) were revealed.

Effects were moderated by professional role, with nurses and doctors reporting stronger positive effects than social workers and volunteers ($\beta = 0.27$, $p = 0.003$). Participation in implementation decisions also served as a moderator between AI adoption and job satisfaction ($\beta = 0.31$, $p < 0.001$), suggesting implementation approach matters as much as the technology itself.

Table 1: Demographic Characteristics (N = 150)

Characteristic	Category	n (%)
Gender	Female	112 (74.7)
	Male	38 (25.3)
Age	20-30 years	42 (28.0)
	31-40 years	63 (42.0)
	41-50 years	35 (23.3)
	>50 years	10 (6.7)
Role	Nurse	68 (45.3)
	Community Health Worker	52 (34.7)
	Physiotherapist	18 (12.0)
	Others	12 (8.0)
Experience	<5 years	38 (25.3)
	5-10 years	72 (48.0)
	>10 years	40 (26.7)
Education	Certificate/Diploma	45 (30.0)
	Bachelor's	87 (58.0)
	Master's or higher	18 (12.0)

Table 2: Changes in Time Allocation Following AI Implementation (N = 150)

Activity	Before AI (hrs/wk)	After AI (hrs/wk)	% Change	p-value
Administrative tasks	12.3	10.7	-13.0%	<0.001
Documentation	9.7	8.4	-13.4%	<0.001
Travel/navigation	8.4	7.2	-14.3%	0.008
Direct care activities	18.6	21.0	+13.0%	<0.001
Team communication	6.8	5.3	-22.1%	<0.001
Training/education	3.2	4.8	+50.0%	<0.001

Table 3: Key Barriers and Facilitators to AI Integration (N = 150)

Barriers	Percentage	Facilitators	Percentage
Infrastructure limitations	76.8	Reduced administrative burden	82.4
Learning curve challenges	41.0	Improved information access	77.5
Technical support availability	65.5	Supportive leadership	63.4
Job displacement concerns	22.0	Participatory implementation	56.3

Emotional Labor and Human Connection

The adoption of AI had a profound emotional impact on workers' experience of palliative care work, where 68% felt more emotionally connected to patients after engaging emotionally with them solely for the purposes of automation. As one nurse with 8 years' experience explained: "I feel that AI has given me back the reason I joined palliative care in the first place. Before, I was drowning in paperwork. Now I can actually sit with my patients, hold their hand and be present with them in their final journey."

Analysis revealed a "redistribution of emotional labor" rather than reduction. With decreased administrative burdens, participants reported more emotional energy for interpersonal interactions, while identifying aspects that should remain human-delivered, particularly end-of-life conversations and spiritual support.

Barriers and Facilitators to AI Integration

Table 3 presents key barriers and facilitators to effective AI integration in Kerala's palliative care context.

A community health worker with 12 years' experience shared: "Initially, I was terrified of these new systems. I'm not from a technology background and I worried I would make mistakes that might affect patient care. But with proper training and support from younger colleagues, I've gained confidence. Now I see these tools as extensions of my capabilities rather than threats to my role."

The community model of Kerala also allowed for the implementation of AI in Kerala using available volunteers. Participants emphasized localizing AI applications to Kerala's specific context, with the most successful implementations involving technologies either developed locally or substantially modified to suit local practices.

Contextual Factors Unique to Kerala

Technology adoption was facilitated by Kerala's high literacy levels and relatively robust technology systems. The history of community involvement in health matters had an impact on implementation where organizations used their volunteer networks to have an ownership and solve the problem about people being replaced by technology.

Cultural barriers arose with regard to privacy standards and traditional care practices. Tensions emerged between Western individual privacy models and Kerala's family-centered approach to information sharing, requiring adaptation of privacy settings to allow appropriate family involvement while protecting sensitive information.

Table 4: Practical Implications for Key Stakeholders

Stakeholder	Key Implications	Implementation Priorities
Healthcare Organizations	Plan for transition periods; ensure participatory approaches; address identity concerns	Develop mentorship programs pairing technical staff with experienced providers
Technology Developers	Create applications for limited resources; support emotional aspects; build cultural flexibility	Collaborate with local teams during design
Policymakers	Invest in rural infrastructure; develop culturally-appropriate regulations; create education initiatives	Establish district-level AI ethics committees

DISCUSSION

Key Findings and Theoretical Implications

This paper presents empirical evidence of the multiple dimensions of AI on workforce sustainability within Kerala's palliative care grid. There are three main issues that deserve consideration:

First, AI implementation significantly influences workforce sustainability by redistributing workload from administrative to person-centered activities. The 13% reduction in administrative tasks and corresponding 13% increase in direct care time aligns with Topol [14] concept of AI "giving time back" to workers. This suggests technology reshapes work composition rather than simply reducing workload, supporting Autor [15] task-based approach where technology complements human labor in complex judgment and interpersonal skills.

Second, redistribution of emotional labor counters technology de-skilling of care work [11]. AI increases ability to connect on a human level by minimizing administrative burden. This builds upon Hochschild [16] approach to emotional labour to suggest that technological change changes the conditions under which emotional labour is performed as opposed to replacing it directly.

Thirdly, what matter in terms of the impacts on the outcomes are the ways in which it is implemented according to the Kerala-style, community based model. The interaction effect of involvement in implementation decision-making ($\beta = 0.31$, $p < 0.001$) on job satisfaction demonstrates the ways in which cultural and contextual factors influence technology adoption pathways and extends implementation science by emphasizing community ownership as integral to the successful incorporation of technology.

Practical Implications

Practical implications for key stakeholders is shown in Table 4.

CONCLUSION AND LIMITATIONS

Due to the cross-sectional nature of this study, we cannot make inferences regarding causality between adoption of AIs and workforce effectiveness. The sample was from different categories of job roles and workplaces in Kerala and hence the results might not be applicable to other settings. Self-report may have been subject to bias given the decreased recall and there was a lack of balance in the study which was largely based from the workers' perspective rather than the service user, and future technology developers.

AI has the potential to improve workforce sustainability in a positive direction by decreasing time spent in administrative tasks and increasing time for direct care and work-life balance, given that implementation is built up around the Kerala community-based model. Based on these findings, the recommendations are:

- Implement a three-phase AI adoption strategy with preparation, guided implementation and evaluation periods
- Ensure meaningful participation of workers and community stakeholders in technology decisions
- Explicitly value emotional and relational aspects of care in performance metrics
- Invest in localizing technologies to specific cultural contexts
- Develop evaluation frameworks assessing workforce sustainability alongside operational outcomes

The incorporation of AI in the palliative care grid in Kerala can potentially create and sustain more manageable workplaces while maintaining the crucial human touch of palliative care.

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